November 2008

66 Series Direct-Operated Regulators and Vacuum Service Equipment

Figure 1. *Exterior of Type 66 or 66Z Regulator*

Introduction

Fisher® 66 Series direct-operated pressure-reducing regulators are widely used in burner control, tank blanketing systems, and other applications where precise control of low-pressure industrial gases is needed, while 66 Series direct-operated vacuum service equipment comes in both vacuum regulator and vacuum breaker constructions. These products differ in pressure capabilities and construction (Figures 1 through 4).

Features

- **Sensitive Response to Pressure Changes**—Minimum lockup at high as well as low inlet pressures is provided on all regulators by a balancing diaphragm that reduces unbalanced forces acting on valve plug.
- **Seat Protection without Sacrifice in Shutoff Capability**—Retainer (Figure 2) of standard Type 66, 66Z, or 66ZZ valve plug assembly closes against the orifice before assembly can over travel and thus over-compress O-ring.
- **Tank Blanketing Capability**—Maximum sensitivity and low outlet pressure accuracy make this an ideal regulator for tank blanketing (padding) applications.
- **Accuracy**—Pitot tube of Type 66, 66Z, or 66ZZ standard cast iron regulator registers body outlet pressure from point of highest velocity, creating a dynamic boost (Figure 5 or 6) that helps provide a more nearly constant downstream pressure and rapid adjustment to small demand changes.
- **Application Flexibility**—Steel and stainless steel bodies are available for increased resistance to piping stresses or whenever dictated by local codes. External registration is standard or optional depending on construction for wherever a remote control line is required.

D100114X012

Specifications

Body Sizes and End Connection Styles

CONSTRUCTION	NOMINAL BODY SIZE, INCH (DN)	END CONNECTION STYLES AND RATINGS[1]	
		Standard Cast Iron Body	Optional Steel Body
Type 66, 66Z, 66ZZ or 66 vacuum regulators or breakers	2 (50)	NPT or CL125FF	NPT (all types), CL150RF (all types), CL150FF, CL300RF
	3, 4 (80, 100)	CL125FF	CL150RF

Maximum Allowable Inlet Pressures[1]

Emergency Inlet Pressure:
Type 66, 66Z, 66ZZ, or 66 Series Vacuum Breakers: 25 psig (1,72 bar) positive pressure
66 Series vacuum regulators: 8 psig or 16.3-inches of mercury (0,55 bar differential) vacuum

Maximum Safe Pressure to Avoid Internal Parts Damage:
Type 66: 10 psig (0,69 bar)
Type 66Z: 5 psig (0,34 bar)
Type 66ZZ: 2 psig (0,14 bar)
66 Series Vacuum Regulators or Breakers: no more than 1 psig (0,07 bar differential) change from spring setting

Maximum Operating Inlet Pressure Recommended for Good Performance:
Type 66, 66Z, or 66 Series Vacuum Breakers: 5 psig (0,34 bar) positive pressure
Type 66ZZ: 2 psig (0,14 bar)
66 Series Vacuum Regulator: 6-inches w.c. or 0.4-inch of mercury (15 mbar differential) vacuum

Outlet (Control) Pressure Ranges
See Tables 1A to 1C

Maximum Allowable Outlet Pressures[1]

Emergency Outlet (Casing) Pressure:
Type 66, 66Z, or 66ZZ: 8 psig (0,55 bar) positive pressure
66 Series Vacuum Regulator: 14.7 psi or 29.9-inches of mercury (1,01 bar differential) vacuum
66 Series Vacuum Breakers: 8 psi or 16.3-inches of mercury (0,55 bar differential) vacuum

Maximum Safe Pressure to Avoid Internal Parts Damage:
Type 66, 66Z, or 66ZZ: 1 psig (0,07 bar differential) above outlet pressure setting
66 Series Vacuum Regulator: no more than 1 psig (0,07 bar differential) change from spring setting

Maximum Operating Pressure Recommended for Good Performance (66 Series Vacuum Regulators or Breakers Only):
Vacuum Regulators: 10 psig or 20.4-inches of mercury (0,69 bar differential) vacuum
Vacuum Breakers: 6-inches w.c. or 0.4-inch of mercury (15 mbar differential) vacuum

Typical Flow Capacities and Performance Curves

Type 66: See Table 4, Figure 5, and "Capacity Information" section

Type 66Z: See Table 5, Figure 6, and "Capacity Information" section

66 Series Vacuum Regulators: See Figure 7 and "Capacity Information" section

Types 66ZZ and 66 Series Vacuum Breakers: Consult your local Sales Office

Flow and Sizing Coefficients
See Tables 2 and 3

Construction Materials

Body, Body Plug, and Bottom Flange Plug when Used: Cast Iron **(standard)**, steel, or 316 stainless steel (optional)

Spring Case, and Spring Case Extension when Used: Steel or 304 Stainless steel (optional)

Disk Plate Assembly Seating Surface when Used: Nitrile (NBR), Fluorocarbon (FKM), or Ethylenepropylene (EPDM)

Diaphragm Case, Diaphragm Plates, Bottom Flange, Spring(s), and Bolting: Plated steel

Diaphragm Spacer: Zinc-plated steel or 316 stainless steel (optional)

Diaphragms, and Valve Plug O-ring and Spring Case Gasket when Used: Nitrile (NBR) **(standard)**, Fluorocarbon (FKM) (high-temperature), Ethylenepropylene (EPDM), or PTFE O-ring and diaphragm protectors

Bottom Flange and Stem Gaskets: Composition

Diaphragm Case and Closing Cap Gaskets: Neoprene (CR)

Pitot Tube when Used: Copper **(standard)** or 304 stainless steel

Sealing Washer: Carbon steel or 316 Stainless steel

Standard Type Y602-10 Vent Assembly: Zinc/ Stainless steel

1. The pressure/temperature limits in this Bulletin and any applicable standard or code limitation for valve should not be exceeded.

- continued -

Specifications (continued)

Construction Materials (continued)

Snap Ring: Bronze

Closing Cap, and Type 66 or 66Z Adjusting Screw and Spring Seats: Zinc

Flapper Valve, and Type 66ZZ or 66 Series Vacuum Regulator or Breaker Adjusting Screw, Spring Retainer, and Spring Case Coupling: Brass

Orifice, Metal Seat Parts: Brass **(standard)** or 316 stainless steel

NACE Construction

Body: Steel

Upper and Lower Diaphragm Case, Sealing Diaphragm Plate, Adjusting Screw and Closing Cap: Steel

Disk Retainer, Disk Nut, Orifice and Miscellaneous Trim Parts: 316 stainless steel

Diaphragm, O-Ring and Common Parts: PTFE, Nitrile (NBR), Ethylenepropylene (EPDM), or Fluorocarbon (FKM)

Elastomer Temperature Capabilities(1)

Nitrile (NBR) (Standard): -40° to 180°F (-40° to 82°C)

Fluorocarbon (FKM): 0° to 350°F (-18° to 177°C)

Ethylenepropylene (EPDM): -40° to 275°F (-40° to 135°C)

Pressure Setting Adjustment

Adjusting Screw

Pressure Registration

Type 66, 66Z, or 66ZZ

Cast Iron Body: Internal **(standard)** or external

Steel Body: External **(standard)** or internal

66 Series Vacuum Regulators or Breakers: External

Control Line when Used: 3/4-inch NPT **(standard)**

Bottom Flange Line when Used: 1/4-inch NPT standard with removable plug

Spring Case Vent: 3/4-inch NPT standard with removable Type Y602-10 vent assembly

Approximate Weights

2-inch (DN 50) Body

NPT Ends: 50 pounds (22,7 kg)

Flanged Ends: 55 pounds (25,0 kg)

3-inch (DN 80) Body: 100 pounds (45,4 kg)

4-inch (DN 100) Body: 155 pounds (70,3 kg)

Options

- Special springs, diaphragm plates, and other internal parts required for higher Type 66 outlet pressure ranges than shown in Table 1.
- Control line connection for cast iron Type 66, 66Z, or 66ZZ.
- Tapped and plugged bottom flange for cast iron or steel Type 66, 66Z, or 66ZZ.
- Adjustable travel stops for 2-inch (DN 50) and 4-inch (DN 100) cast iron Type 66.
- All-metal seats

1. The pressure/temperature limits in this Bulletin and any applicable standard or code limitation for valve should not be exceeded.

- **Severe Service Capability**—Fluorocarbon (FKM), Ethylenepropylene (EPDM), and Polytetrafluoroethylene (PTFE) O-rings and stainless steel metal trim parts are available for high temperatures and/or corrosive flowing media. Optional all-metal seats eliminate O-ring seat erosion problems with coke gas or other corrosive applications. Metal valve plug also has knife-edged guides on the valve plug skirts to help prevent particle accumulation with dirty service.
- **Positive Guiding**—Valve plug coupling on 66 Series vacuum regulators and breakers prevent incorrect seating due to cocking or improper guiding of valve plug assembly.
- **Sour Gas Service Capability**—Optional materials are available for applications handling sour gases. These constructions comply with the recommendations of NACE International Standards MR0175 and MR0103.

Table 1A. *Outlet (Control) Pressure Ranges, 2-inch (DN 50) Body*

CONSTRUCTION	OUTLET (CONTROL) PRESSURE RANGE		CONTROL SPRING INFORMATION			
	Inches w.c. Unless Otherwise Designated	mbar	2-inch (DN 50) Body			
			Part Number	Color Code	Free Length, Inches (mm)	Wire Diameter, Inches (mm)
Type 66	4 to 11[1] 8 to 28[1]	10 to 27[1] 20 to 70[1]	0B019727052 1E6114000A2	Purple Stripe Orange Stripe	6.00 (152) 6.00 (152)	0.148 (3,76) 0.200 (5,08)
	2 to 5 4 to 8	5 to 12 10 to 20	1D892527022 1D892627022	Brown Stripe Red Stripe	6.12 (155) 7.53 (191)	0.109 (2,77) 0.112 (2,85)
	7 to 12 10 to 17 14 to 28	17 to 30 25 to 42 35 to 70	1D892727012 1D892827032 1D892927032	Black Stripe Orange Stripe Purple Stripe	7.88 (200) 7.75 (197) 7.53 (191)	0.130 (3,30) 0.148 (3,76) 0.162 (4,12)
	0.75 to 1.5 psig 1 to 2 psig 1.5 to 3 psig 3 to 5 psig	0,05 to 0,10 bar 0,07 to 0,14 bar 0,10 to 0,21 bar 0,21 to 0,34 bar	1D765727032[2] 1D765827032[2] 1D962627032[2] 1N506427142[3]	Red Stripe Unpainted Unpainted Black Stripe	6.09 (155) 6.00 (152) 6.25 (159) 6.31 (160)	0.207 (5,26) 0.225 (5,72) 0.262 (6,66) 0.283 (7,19)
Type 66Z	-1 to 2	-2 to 5	1D892527022	Brown Stripe	6.12 (155)	0.109 (2,77)
Type 66ZZ	-0.25 to 0.25	-0,62 to 0,62	1E991427012	Red Stripe	5.62 (143)	0.085 (2,16)
66 Series vacuum regulators or breakers	0 to -2 -0.2 to -0.8 -2 to -6	0 to -5 -0,74 to -2 -5 to -15	1J196527012 1H387327012 1N152427012	Blue Stripe Green Stripe Black Stripe	5.62 (143) 5.62 (143) 5.62 (143)	0.102 (2,59) 0.095 (2,41) 0.112 (2,85)

1. 1 psig (0,07 bar) minimum differential pressure required with this range.
2. Heavy head construction required.
3. Extra heavy head construction required.

Table 1B. *Outlet (Control) Pressure Ranges, 3-inch (DN 80) Body*

CONSTRUCTION	OUTLET (CONTROL) PRESSURE RANGE		CONTROL SPRING INFORMATION			
	Inches w.c. Unless Otherwise Designated	mbar	3-inch (DN 80) Body			
			Part Number	Color Code	Free Length, Inches (mm)	Wire Diameter, Inches (mm)
Type 66	4 to 11[1] 8 to 28[1]	10 to 27[1] 20 to 70[1]	1D479927032 1D527327022	Yellow Stripe White Stripe	6.00 (152) 6.00 (152)	0.162 (4,12) 0.207 (5,26)
	2 to 5 4 to 8	5 to 12 10 to 20	1D893027022 1D893127012	Brown Stripe Unpainted	6.12 (155) 7.12 (181)	0.112 (2,85) 0.125 (3,18)
	7 to 12 10 to 17 14 to 28	17 to 30 25 to 42 35 to 70	1D892827032 1D893227032 1D893327032	Orange Stripe White Stripe Green Stripe	7.75 (197) 7.50 (191) 7.25 (184)	0.148 (3,76) 0.156 (3,96) 0.182 (4,62)
	0.75 to 1.5 psig 1 to 2 psig 1.5 to 3 psig 3 to 5 psig	0,05 to 0,10 bar 0,07 to 0,14 bar 0,10 to 0,21 bar 0,21 to 0,34 bar	1D765827032[2] 1D962627032[2] 1E204427032[2] 1N506527142[3]	Unpainted Unpainted White and Red Stripe Brown and Purple Stripe	6.00 (152) 6.25 (159) 6.38 (162) 6.38 (162)	0.225 (5,72) 0.262 (6,66) 0.306 (7,77) 0.362 (9,20)
Type 66Z	-1 to 2	-2 to 5	1D893027022	Brown Stripe	6.12 (155)	0.112 (2,85)
Type 66ZZ	-0.25 to 0.25	-0,62 to 0,62	1E991527012	Purple Stripe	8.62 (219)	0.100 (2,54)
66 Series vacuum regulators or breakers	0 to -2 -2 to -6	0 to -5 -5 to -15	1J196627012 1K384427012	Gray Stripe Pink Stripe	5.62 (143) 5.62 (143)	0.114 (2,90) 0.120 (3,05)

1. 1 psig (0,07 bar) minimum differential pressure required with this range.
2. Heavy head construction required.
3. Extra heavy head construction required.

Table 1C. *Outlet (Control) Pressure Ranges, 4-inch (DN 100) Body*

CONSTRUCTION	OUTLET (CONTROL) PRESSURE RANGE		CONTROL SPRING INFORMATION			
	Inches w.c. Unless Otherwise Designated	mbar	4-inch (DN 100) Body			
			Part Number	Color Code	Free Length, Inches (mm)	Wire Diameter, Inches (mm)
Type 66	4 to 11(1) 8 to 28(1)	10 to 27(1) 20 to 70(1)	1D527527022 1D527627032	Gray Stripe Gray and White Stripe	7.75 (197) 7.75 (197)	0.170 (4,32) 0.225 (5,72)
	2 to 5 4 to 8	5 to 12 10 to 20	1D892627022 1D893427022	Red Stripe Green Stripe	7.53 (191) 7.75 (197)	0.112 (2,85) 0.135 (3,43)
	7 to 12 10 to 17 14 to 28	17 to 30 25 to 42 35 to 70	1D893227032 1D893527032 1D893627032	White Stripe Yellow Stripe Light Blue Stripe	7.50 (191) 7.75 (197) 7.81 (198)	0.156 (3,96) 0.170 (4,32) 0.207 (5,26)
	0.75 to 1.5 psig 1 to 2 psig 1.5 to 3 psig 3 to 5 psig	0,05 to 0,10 bar 0,07 to 0,14 bar 0,10 to 0,21 bar 0,21 to 0,34 bar	1D771227032(2) 1D771327032(2) 1E204527032(3) - - - -	Pink and Blue Stripe Silver Stripe Pink Stripe - - - -	7.75 (197) 7.75 (197) 7.53 (191) - - - -	0.262 (6,66) 0.283 (7,19) 0.331 (8,41) - - - -
Type 66Z	-1 to 2	-2 to 5	1D892627022	Red Stripe	7.53 (191)	0.112 (2,85)
Type 66ZZ	-0.25 to 0.25	-0,62 to 0,62	1E937227012	White Stripe	11.06 (281)	0.112 (2,85)
66 Series vacuum regulators or breakers	0 to -2 -0.2 to -0.8 -2 to -6 0 to 1.5	0 to -5 -0,74 to -2 -5 to -15 0 to 4	1J196727012 1E937227012 1K418127012 1J823827012	Black Stripe White Stripe Yellow Stripe Brown Stripe	11.06 (281) 11.06 (281) 11.50 (292) 11.56 (294)	0.154 (3,91) 0.112 (2,85) 0.162 (4,12) 0.135 (3,43)

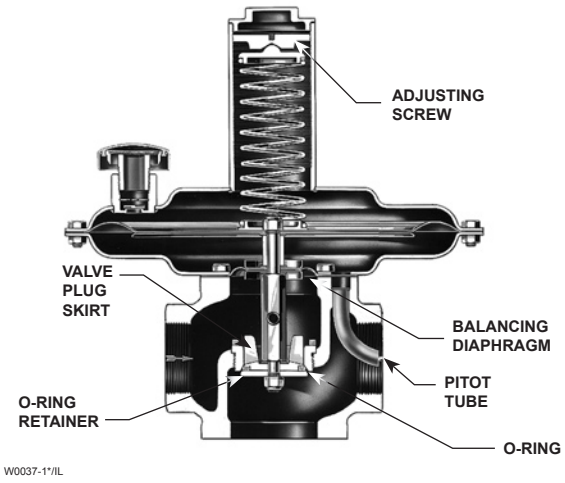
1. 1 psig (0,07 bar) minimum differential pressure required with this range.
2. Heavy head construction required.
3. Extra heavy head construction required.

Table 2. *Flow Coefficients*

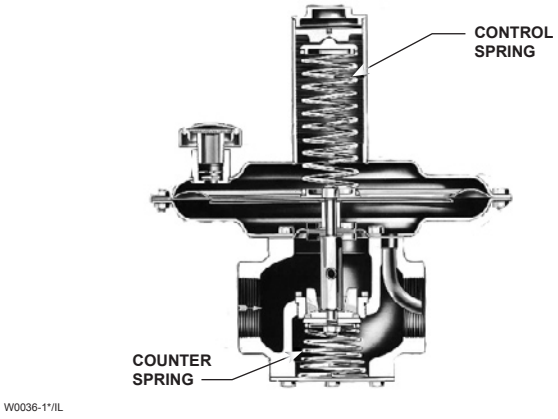
OUTLET PRESSURE RANGE, PSIG (bar)	DROOP, PSIG (bar)	REGULATING C_g			REGULATING C_v			WIDE-OPEN C_g			WIDE-OPEN C_v			C_1
		2-inch (DN 50)	3-inch (DN 80)	4-inch (DN 100)	2-inch (DN 50)	3-inch (DN 80)	4-inch (DN 100)	2-inch (DN 50)	3-inch (DN 80)	4-inch (DN 100)	2-inch (DN 50)	3-inch (DN 80)	4-inch (DN 100)	
0.75 to 1.5 (0,05 to 0,10)	0.2 (0,01) 0.3 (0,02)	765 1150	1865 2800	3330 5000	21.9 32.9	53.3 80	95.1 143							
1 to 2 (0,07 to 0,14)	0.3 (0,02) 0.4 (0,03)	825 1100	1650 2200	3150 4200	23.6 31.4	47.1 62.9	90 120							
1.5 to 3 (0,10 to 0,21)	0.4 (0,03) 0.6 (0,04)	665 1000	1165 1750	2500 3750	19 28.6	33.3 50	71.4 107	1260	3400	5250	36	97.1	150	35
3 to 5 (0,21 to 0,34)	0.6 (0,04) 0.8 (0,06) 1.0 (0,07)	540 720 900	725 970 1210	- - - -	15.4 20.6 25.7	20.7 27.7 34.6	- - - -							

Table 3. *IEC Sizing Coefficients*

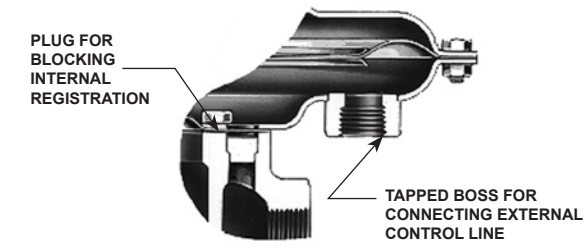
BODY SIZE, INCH (DN)	X_T	F_D	F_L
2 (50)	0.775	0.35	0.89
3 (80)		0.34	
4 (100)		0.30	



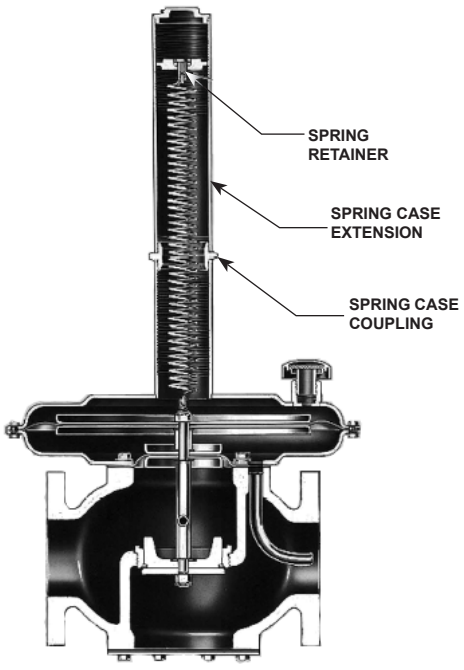
STANDARD TYPE 66 REGULATOR WITH INTERNAL REGISTRATION



STANDARD TYPE 66Z REGULATOR WITH INTERNAL REGISTRATION



DETAIL OF EXTERNAL REGISTRATION CONSTRUCTION



STANDARD TYPE 66ZZ REGULATOR WITH INTERNAL REGISTRATION

Figure 2. *Types 66, 66Z, and 66ZZ Construction Details*

Available Configurations

Constructions come standard with cast iron bodies and pitot tube style internal registration that eliminates the need for control line piping. Steel-body regulators also are available and come standard with a tapped connection boss on the diaphragm case for external registration that requires a separate control line.

Vacuum regulators and breakers in this series come standard with a tapped connection boss on the diaphragm case for external registration that requires a separate control line.

The vacuum regulators are used to prevent a decrease in vacuum (increase in absolute pressure). A decrease in the controlled vacuum opens the regulator, allowing higher vacuum at the outlet to restore the controlled vacuum to setpoint.

The vacuum breakers are used in applications where a vacuum must be limited. An increase in vacuum (decrease in absolute pressure) opens the breaker, allowing atmospheric pressure or lower vacuum to restore the controlled vacuum to setpoint.

Types 66 and 66ZZ regulators both use a single control spring, but the Type 66ZZ regulator's spring has a low rate of tension and can be stretched between the adjusting screw and valve plug stem to enable outlet settings slightly below atmospheric pressure and even more sensitive regulation than is available with the Type 66 regulator. The Type 66Z regulator uses an additional spring under the valve plug and disk assembly to counter the control spring effect and balance the weight of the internal parts, thus permitting below-atmospheric settings with a more compact construction than is available with the Type 66ZZ regulator.

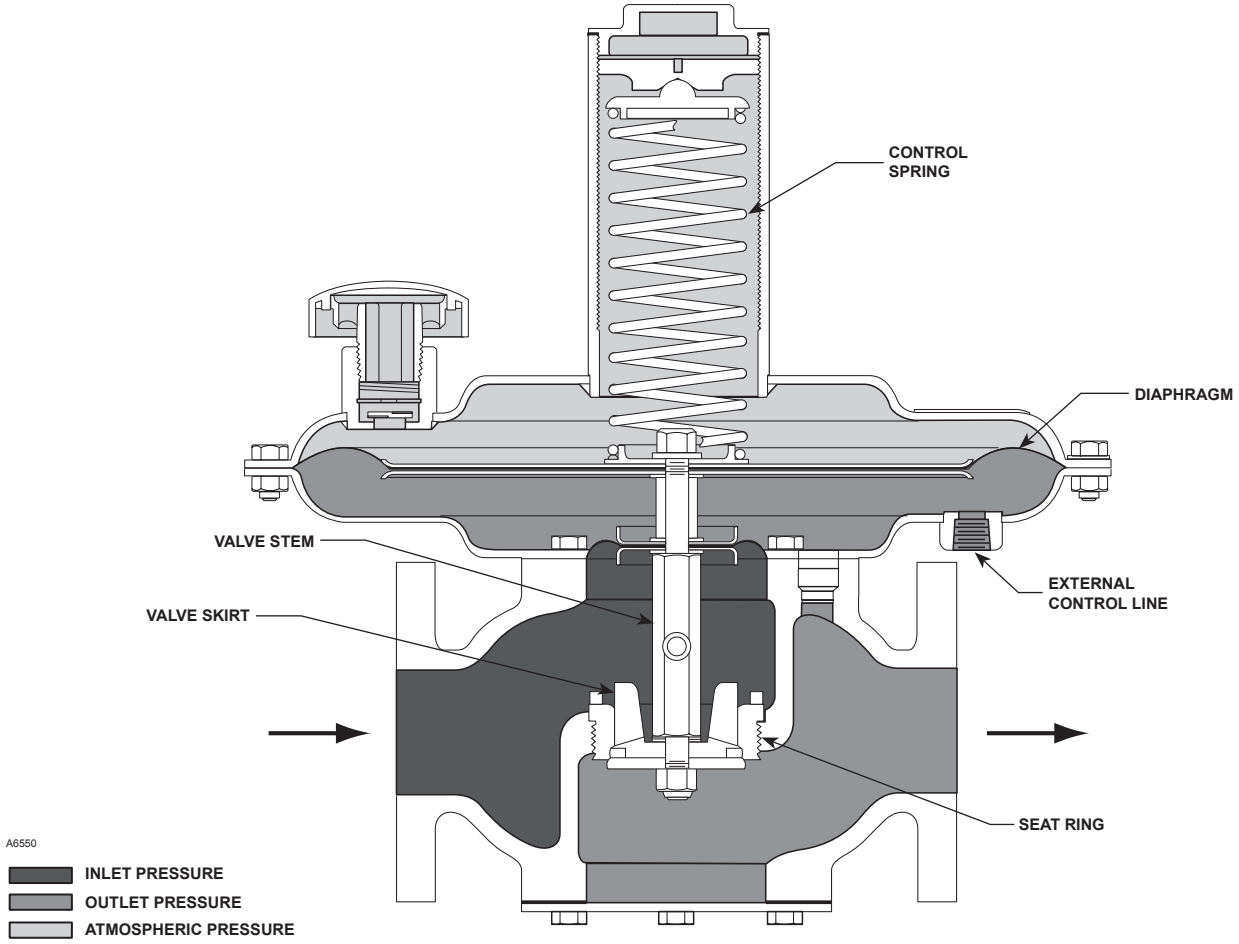


Figure 3. *Standard Steel Body Operational Schematic*

Principle of Operation

In the cast iron Type 66 regulator, a pitot tube senses outlet pressure. In a steel Type 66 regulator, an external control line senses outlet pressure. Both pressure-sensing methods register the outlet pressure under the main diaphragm. When increased downstream demand lowers the outlet pressure, the lower pressure under the main diaphragm causes the regulator main spring and valve plug and stem assembly to open the regulator orifice and to supply more gas to the downstream system.

When decreased downstream demand raises the outlet pressure, the higher pressure under the main diaphragm opposes the regulator main spring causing the valve plug and stem assembly to close the regulator orifice and to supply less gas to the downstream system.

The Types 66Z and 66ZZ regulators are identical to the Type 66 regulator in operation but different in construction. The Type 66Z regulator has a counter spring under the valve plug and disk assembly which counters the main spring force to allow settings below atmospheric pressures. The Type 66ZZ regulator has a longer spring case where the main spring, a low rate tension spring, is stretched between the adjusting screw and the valve plug stem, also providing below atmospheric settings and more sensitive pressure regulation than the Types 66 and 66Z regulators.

Installation

A 66 Series regulator or breaker should be installed horizontally with the diaphragm casings vertical above the body. Other orientations will change the setpoint and outlet pressure range due to the weight of the internal parts. Typical installations are shown in Figures 8 through 10.

To obtain the maximum flow capacities in some instances, outlet piping will have to be swaged up above the body sizes.

Connection locations and dimensions are both shown in Figure 11.

Overpressure Protection

66 Series pressure-reducing regulators, vacuum regulators, and vacuum breakers have different inlet and outlet pressure ratings. Complete downstream overpressure protection is needed whenever the maximum allowable inlet pressure can exceed the outlet pressure rating, and upstream protection for a 66 Series vacuum regulator additionally is needed if there is any chance of a vacuum greater than 8 psi or 16.3-inches of mercury (0,55 bar differential) occurring at the inlet of this kind of regulator.

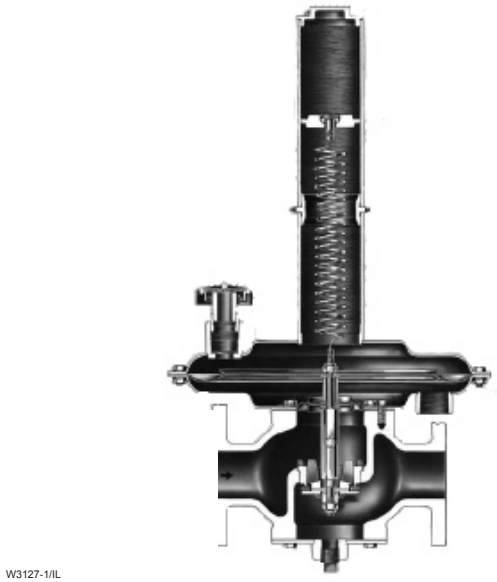
Overpressuring any portion of a regulator, breaker, or associated equipment may cause leakage, part damage, or personal injury due to bursting of pressure-containing parts, explosion of accumulated gas, or implosion due to excessive vacuum. Regulator or breaker operation within ratings does not preclude the possibility of damage from external sources or from debris in the pipeline. A regulator or breaker should be inspected for damage periodically and after any overpressure condition.

Capacity Information

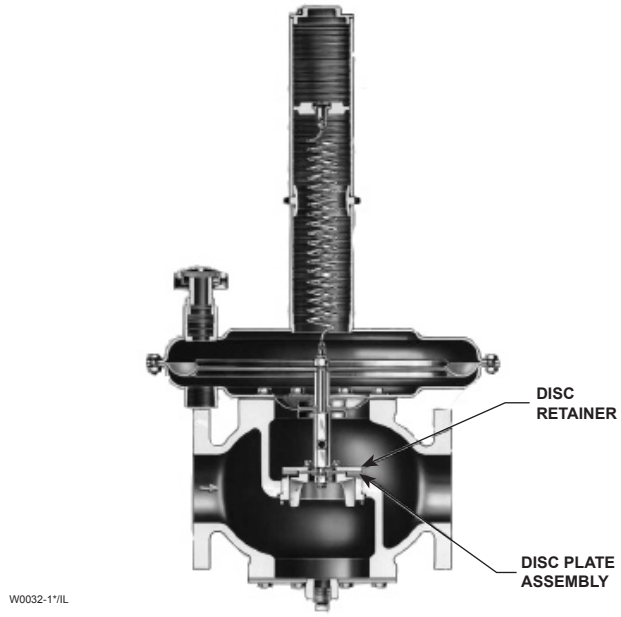
Table 4 gives Type 66 and Table 5 gives Type 66Z natural gas regulating capacities at selected inlet pressures and outlet pressure settings. Flows are in SCFH at 60°F and 14.7 psia (and in Nm^3/h at 0°C and 1,01325 bar) of 0.6 specific gravity natural gas.

To determine equivalent capacities for air, propane, butane, or nitrogen, multiply Table 4 or 5 capacity by the following appropriate conversion factor: 0.775 for air, 0.628 for propane, 0.548 for butane, or 0.789 for nitrogen. For gases of other specific gravities, multiply the given capacity by 0.775 and divide by the square root of the appropriate specific gravity. Then, if capacity is desired in normal cubic meters per hour (Nm^3/h) at 0°C and 1,01325 bar absolute, multiply SCFH by 0.0268.

For service conditions where the pressure drop across the regulator is less than the critical pressure drop, (absolute outlet pressure greater than one-half the absolute inlet pressure), use the sizing nomographs in Fisher® Catalog 10, or the Fisher sizing program. (Use C_1 = 35)



VACUUM BREAKER



VACUUM REGULATOR

Figure 4. *66 Series Vacuum Regulator and Breaker Construction Details*

Table 4. *Selected Type 66 Regulating Capacities in SCFH (Nm³/h) of 0.6 Specific Gravity Natural Gas[1]*

BODY SIZE, INCH (DN)	SPRING RANGE AND PART NUMBER, INCHES W.C. (mbar)	OUTLET PRESSURE SETTING, INCHES W.C. (mbar)	PROPORTIONAL BAND (FROM SETPOINT), INCHES W.C. (mbar)	INLET PRESSURE, SCFH (Nm³/h)							
				0.3 psig (0,02 bar)	0.5 psig (0,03 bar)	0.75 psig (0,05 bar)	1.0 psig (0,07 bar)	1.5 psig (0,10 bar)	2.0 psig (0,14 bar)	3.0 psig (0,21 bar)	5 to 10 psig (0,34 to 0,69 bar)
2 (50)	2 to 5 (5 to 12) 1D892527022	2.0 (5)	-1/2 to 3/4 (-1 to 2)	4900 (131) D[2]	6700 (180) D[2]	8250 (221) D[2]	10 000 (268) D[2]	9300 (249) B[2]	9150 (245) B[2]	8500 (228) B[2]	8500 (228) B[2]
		4.0 (10)		3900 (105) D[2]	6200 (166) D[2]	7850 (210) D[2]	9550 (256) D[2]	11 750 (315) B[2]	10 800 (289) B[2]	10 800 (289) B[2]	10 300 (276) B[2]
	4 to 8 (10 to 20) 1D892627022	6.0 (15)	-3/4 to 1-1/8 (-2 to 3)	2840 (76,1) D[1]	5800 (155) D[2]	7600 (204) D[2]	9550 (256) D[2]	12 100 (324) D[2]	13 500 (362) B[2]	10 800 (289) B[2]	10 300 (276) B[2]
	7 to 12 (17 to 30) 1D892727012	9.0 (22)	-1-1/4 to 1-7/8 (-3 to 5)	- - - -	3200 (85,8) D[2]	6450 (173) D[2]	8700 (233) D[2]	11 100 (297) D[2]	13 400 (359) B[2]	15 100 (405) B[2]	13 400 (359) B[2]
		12 (30)		- - - -	- - - -	4500 (121) D[2]	6450 (173) D[2]	10 600 (284) D[2]	13 300 (356) D[2]	15 500 (415) D[2]	13 900 (373) B[2]
	10 to 17 (25 to 42) 1D892827032	16 (40)		- - - -	- - - -	- - - -	4650 (125) D[2]	9000 (241) D[2]	12 900 (346) D[2]	16 750 (449) D[2]	16 450 (441) B[2]
	14 to 28 (35 to 70) 1D892927032	20 (50)	-2 to 3 (-5 to 7)	- - - -	- - - -	- - - -	- - - -	8400 (225) D[2]	12 250 (328) D[2]	16 100 (431) D[2]	18 000 (482) B[2]
		24 (60)		- - - -	- - - -	- - - -	- - - -	7750 (208) D[2]	11 600 (311) D[2]	15 500 (415) D[2]	20 000 (536) B[2]
		28 (70)		- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	12 900 (346) D[2]	20 000 (536) B[2]
3 (80)	2 to 5 (5 to 12) 1D893027022	2.0 (5)	-1/2 to 3/4 (-1 to 2)	9000 (241) D[2]	12 900 (346) D[2]	15 500 (415) D[2]	21 300 (571) D[2]	26 400 (708) D[2]	29 600 (793) B[2]	25 100 (673) B[2]	23 200 (622) B[2]
		4.0 (10)		8700 (233) D[2]	12 900 (346) D[2]	15 500 (415) D[2]	21 300 (571) D[2]	26 400 (708) D[2]	29 600 (793) B[2]	25 100 (673) B[2]	23 200 (622) B[2]
	4 to 8 (10 to 20) 1D893127012	6.0 (15)	-3/4 to 1-1/8 (-2 to 3)	6125 (164) D[1]	12 250 (328) D[2]	16 750 (449) D[2]	18 000 (482) D[2]	23 200 (622) D[2]	30 000 (804) B[2]	36 100 (967) B[2]	31 000 (831) B[2]
	7 to 12 (17 to 30) 1D892827032	9.0 (22)	-1-1/4 to 1-7/8 (-3 to 5)	- - - -	8250 (221) D[2]	12 900 (346) D[2]	18 000 (482) D[2]	23 200 (622) D[2]	33 500 (898) D[2]	37 400 (1002) D[2]	46 400 (1244) D[2]
		12 (30)		- - - -	- - - -	8400 (225) D[2]	14 200 (381) D[2]	20 600 (552) D[2]	28 400 (761) D[2]	36 750 (985) D[2]	46 400 (1244) D[2]
	10 to 17 (25 to 42) 1D893227032	16 (40)		- - - -	- - - -	- - - -	7750 (208) D[2]	18 000 (482) D[2]	23 200 (622) D[2]	36 100 (967) D[2]	49 000 (1313) D[2]
	14 to 28 (35 to 70) 1D893327032	20 (50)	-2 to 3 (-5 to 7)	- - - -	- - - -	- - - -	- - - -	12 900 (346) D[2]	20 600 (552) D[2]	32 200 (863) D[2]	46 400 (1244) D[2]
		24 (60)		- - - -	- - - -	- - - -	- - - -	11 600 (311) D[2]	19 300 (517) D[2]	25 800 (691) D[2]	46 400 (1244) D[2]
		28 (70)		- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	23 200 (622) D[2]	46 400 (1244) D[2]

1. See “Capacity Information” section for conversion to other gases and/or nomal cubic meters per hour.
2. Values based on D (droop) or B (boost)

- continued -

Table 4. *Selected Type 66 Regulating Capacities in SCFH (Nm³/h) of 0.6 Specific Gravity Natural Gas[1] (continued)*

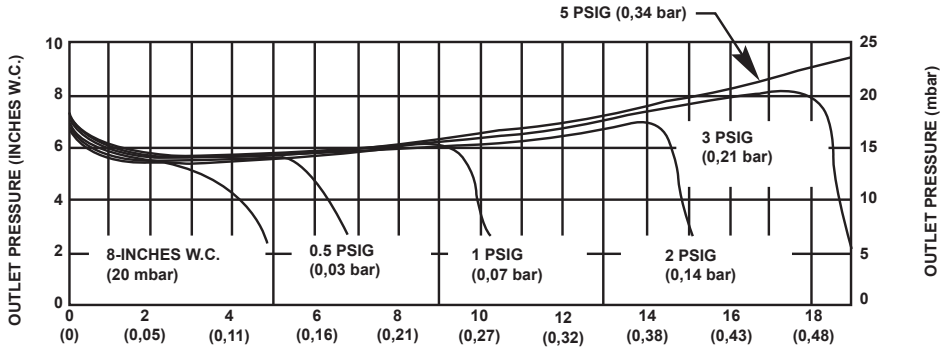
BODY SIZE, INCH (DN)	SPRING RANGE AND PART NUMBER, INCHES W.C. (mbar)	OUTLET PRESSURE SETTING, INCHES W.C. (mbar)	PROPORTIONAL BAND (FROM SETPOINT), INCHES W.C. (mbar)	INLET PRESSURE, SCFH (Nm³/h)							
				0.3 psig (0,02 bar)	0.5 psig (0,03 bar)	0.75 psig (0,05 bar)	1.0 psig (0,07 bar)	1.5 psig (0,10 bar)	2.0 psig (0,14 bar)	3.0 psig (0,21 bar)	5 to 10 psig (0,34 to 0,69 bar)
4 (100)	2 to 5 (5 to 12) 1D892627022	2.0 (5)	–1/2 to 3/4 (–1 to 2)	15 500 (415) D[2]	23 200 (622) D[2]	28 400 (761) B[2]	36 100 (967) B[2]	36 100 (967) B[2]	36 100 (967) B[2]	36 100 (967) B[2]	36 100 (967) B[2]
		4.0 (10)		15 500 (415) D[2]	23 200 (622) D[2]	28 400 (761) B[2]	36 100 (967) B[2]	36 100 (967) B[2]	36 100 (967) B[2]	36 100 (967) B[2]	36 100 (967) B[2]
	4 to 8 (10 to 20) 1D893427022	6.0 (15)	–3/4 to 1-1/8 (–2 to 3)	11 600 (311) D[2]	18 000 (482) D[2]	24 500 (657) D[2]	34 800 (933) D[2]	38 700 (1037) B[2]	43 800 (1174) B[2]	43 000 (1152) B[2]	43 800 (1174) B[2]
	7 to 12 (17 to 30) 1D893227032	9.0 (22)	–1-1/4 to 1-7/8 (–3 to 5)	- - - -	12 900 (346) D[2]	20 600 (552) D[2]	33 500 (898) D[2]	41 300 (1107) D[2]	51 500 (1380) B[2]	51 500 (1380) B[2]	51 500 (1380) B[2]
		12 (30)		- - - -	- - - -	12 900 (346) D[2]	22 600 (606) D[2]	38 700 (1037) D[2]	51 500 (1380) D[2]	58 000 (1554) D[2]	56 700 (1520) D[2]
	10 to 17 (25 to 42) 1D893527032	16 (40)		- - - -	- - - -	- - - -	20 600 (552) D[2]	36 100 (967) D[2]	51 500 (1380) D[2]	64 500 (1729) D[2]	61 800 (1656) D[2]
	14 to 28 (35 to 70) 1D893627032	20 (50)	–2 to 3 (–5 to 7)	- - - -	- - - -	- - - -	- - - -	27 000 (724) D[2]	46 400 (1244) D[2]	61 800 (1656) D[2]	71 000 (1903) D[2]
		24 (60)		- - - -	- - - -	- - - -	- - - -	- - - -	41 300 (1107) D[2]	61 800 (1656) D[2]	77 500 (2077) D[2]
		28 (70)		- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	58 000 (1554) D[2]	77 500 (2077) D[2]

1. See “Capacity Information” section for conversion to other gases and/or nomal cubic meters per hour.
2. Values based on D (droop) or B (boost)

Table 5. *Selected Type 66Z Regulating Capacities in SCFH (Nm³/h) of 0.6 Specific Gravity Natural Gas[1]*

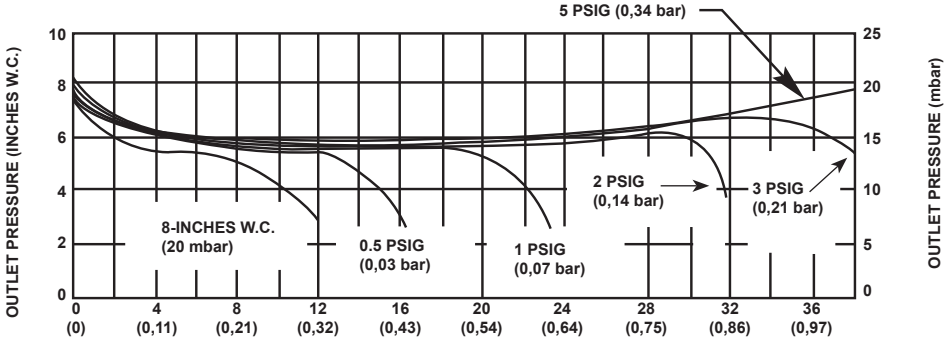
INLET PRESSURE	2-INCHES W.C. (5 mbar) OUTLET PRESSURE SETTING		
	2-inch (DN 50) Body	3-inch (DN 80) Body	4-inch (DN 100) Body
3-inches w.c. (7 mbar)	1930 (51,7)	3870 (104)	7750 (208)
4-inches w.c. (10 mbar)	2320 (62,2)	5160 (138)	9000 (241)
8-inches w.c. (20 mbar)	4900 (131)	9000 (241)	15 500 (415)
14-inches w.c. (35 mbar)	6700 (180)	12 900 (346)	23 200 (622)
1 psig (0,07 bar)	10 000 (268)	21 300 (571)	36 100 (967)
2 psig (0,14 bar)	9150 (245)	26 400 (708)	36 100 (967)
3 psig (0,21 bar)	8500 (228)	33 500 (898)	50 000 (1340)
5 psig (0,34 bar)	8500 (228)	36 100 (967)	50 000 (1340)

1. See “Capacity Information” section for conversion to equivalent capacities of other gases and/or normal cubic meters per hour.


5 PSIG (0,34 bar)
OUTLET PRESSURE (INCHES W.C.)
OUTLET PRESSURE (mbar)
3 PSIG (0,21 bar)
8-INCHES W.C. (20 mbar)
0.5 PSIG (0,03 bar)
1 PSIG (0,07 bar)
2 PSIG (0,14 bar)
0 2 4 6 8 10 12 14 16 18
(0) (0,05) (0,11) (0,16) (0,21) (0,27) (0,32) (0,38) (0,43) (0,48)
0 2 4 6 8 10 15 20 25

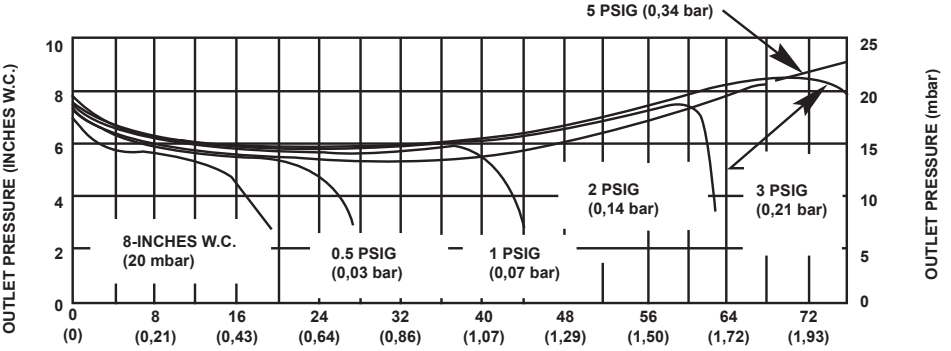
FLOW RATE IN THOUSAND SCFH (Nm^3/h)
OF 0.6 SPECIFIC GRAVITY NATURAL GAS

2-INCH (DN 50) BODY


5 PSIG (0,34 bar)
OUTLET PRESSURE (INCHES W.C.)
OUTLET PRESSURE (mbar)
2 PSIG (0,14 bar)
3 PSIG (0,21 bar)
8-INCHES W.C. (20 mbar)
0.5 PSIG (0,03 bar)
1 PSIG (0,07 bar)
0 4 8 12 16 20 24 28 32 36
(0) (0,11) (0,21) (0,32) (0,43) (0,54) (0,64) (0,75) (0,86) (0,97)
0 2 4 6 8 10 15 20 25

FLOW RATE IN THOUSAND SCFH (Nm^3/h)
OF 0.6 SPECIFIC GRAVITY NATURAL GAS

3-INCH (DN 80) BODY


5 PSIG (0,34 bar)
OUTLET PRESSURE (INCHES W.C.)
OUTLET PRESSURE (mbar)
2 PSIG (0,14 bar)
3 PSIG (0,21 bar)
8-INCHES W.C. (20 mbar)
0.5 PSIG (0,03 bar)
1 PSIG (0,07 bar)
0 8 16 24 32 40 48 56 64 72
(0) (0,21) (0,43) (0,64) (0,86) (1,07) (1,29) (1,50) (1,72) (1,93)
0 2 4 6 8 10 15 20 25

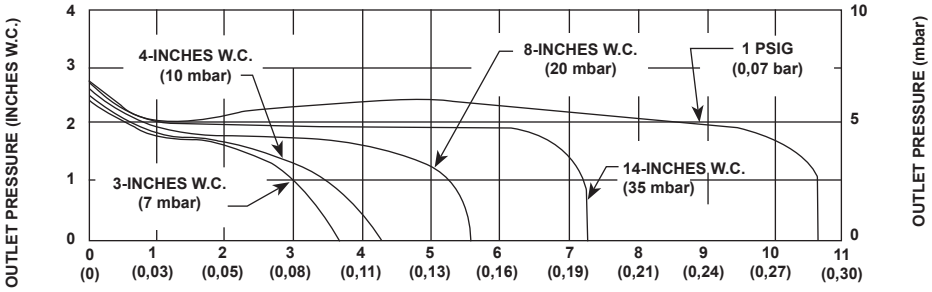
FLOW RATE IN THOUSAND SCFH (Nm^3/h)
OF 0.6 SPECIFIC GRAVITY NATURAL GAS

4-INCH (DN 100) BODY

NOTE:
SEE "CAPACITY INFORMATION" SECTION FOR CONVERSION TO EQUIVALENT CAPACITIES OF OTHER GASES AND/OR NORMAL CUBIC METERS PER HOUR. EACH CURVE REPRESENTS A DIFFERENT INLET PRESSURE AS MARKED. ALL MEASUREMENTS MADE AT 6-INCHES W.C. (15 mbar) OUTLET PRESSURE SETTING AND TAKEN AT OUTLET END OF REGULATOR IN PIPE SWAGED UP 12 PIPE DIAMETERS FROM REGULATOR OUTLET AS FOLLOWS:
2-INCH (DN 50) BODY: IN 2-INCHES (50,8 mm) OUTLET PIPE SWAGED UP TO 4-NCHES (102 mm)
3-INCH (DN 80) BODY: IN 3-INCHES (76,2 mm) OUTLET PIPE SWAGED UP TO 8-INCHES (203 mm)
4-INCH (DN 100) BODY: IN 4-INCHES (102 mm) OUTLET PIPE SWAGED UP TO 8-INCHES (203 mm)

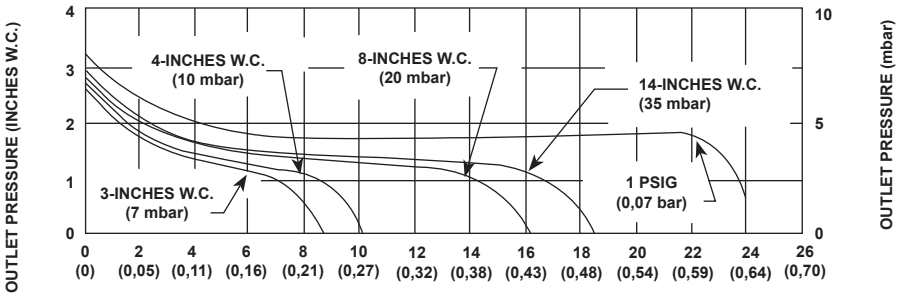
BE2403
BE2404
BE2405
A2567/IL

Figure 5. *Typical Performance Curves for Standard Type 66 Regulator with Internal Registration*


OUTLET PRESSURE (INCHES W.C.)
OUTLET PRESSURE (mbar)
4-INCHES W.C. (10 mbar)
8-INCHES W.C. (20 mbar)
1 PSIG (0,07 bar)
3-INCHES W.C. (7 mbar)
14-INCHES W.C. (35 mbar)
0 1 2 3 4
0 5 10
0 1 2 3 4 5 6 7 8 9 10 11
(0) (0,03) (0,05) (0,08) (0,11) (0,13) (0,16) (0,19) (0,21) (0,24) (0,27) (0,30)

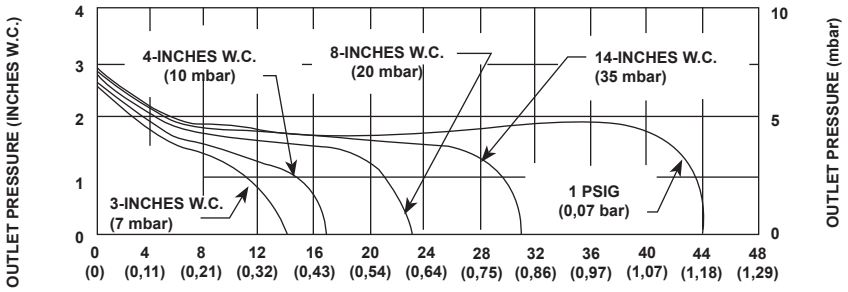
FLOW RATE IN THOUSAND SCFH (Nm³/h)
OF 0.6 SPECIFIC GRAVITY NATURAL GAS

2-INCH (DN 50) BODY


OUTLET PRESSURE (INCHES W.C.)
OUTLET PRESSURE (mbar)
4-INCHES W.C. (10 mbar)
8-INCHES W.C. (20 mbar)
14-INCHES W.C. (35 mbar)
3-INCHES W.C. (7 mbar)
1 PSIG (0,07 bar)
0 1 2 3 4
0 5 10
0 2 4 6 8 10 12 14 16 18 20 22 24 26
(0) (0,05) (0,11) (0,16) (0,21) (0,27) (0,32) (0,38) (0,43) (0,48) (0,54) (0,59) (0,64) (0,70)

FLOW RATE IN THOUSAND SCFH (Nm³/h)
OF 0.6 SPECIFIC GRAVITY NATURAL GAS

3-INCH (DN 80) BODY


OUTLET PRESSURE (INCHES W.C.)
OUTLET PRESSURE (mbar)
4-INCHES W.C. (10 mbar)
8-INCHES W.C. (20 mbar)
14-INCHES W.C. (35 mbar)
3-INCHES W.C. (7 mbar)
1 PSIG (0,07 bar)
0 1 2 3 4
0 5 10
0 4 8 12 16 20 24 28 32 36 40 44 48
(0) (0,11) (0,21) (0,32) (0,43) (0,54) (0,64) (0,75) (0,86) (0,97) (1,07) (1,18) (1,29)

FLOW RATE IN THOUSAND SCFH (Nm³/h)
OF 0.6 SPECIFIC GRAVITY NATURAL GAS

4-INCH (DN 100) BODY

NOTE:
SEE "CAPACITY INFORMATION" SECTION FOR CONVERSION TO EQUIVALENT CAPACITIES OF OTHER GASES AND/OR NORMAL CUBIC METERS PER HOUR. EACH CURVE REPRESENTS A DIFFERENT INLET PRESSURE AS MARKED. ALL MEASUREMENTS MADE AT 2-INCHES W.C. (5 mbar) OUTLET PRESSURE SETTING AND TAKEN AT OUTLET END OF REGULATOR IN PIPE SWAGED UP 12 PIPE DIAMETERS FROM REGULATOR OUTLET AS FOLLOWS:
2-INCH (DN 50) BODY: IN 2-INCHES (50,8 mm) OUTLET PIPE SWAGED UP TO 4-INCHES (102 mm)
3-INCH (DN 80) BODY: IN 3-INCHES (76,2 mm) OUTLET PIPE SWAGED UP TO 8-INCHES (203 mm)
4-INCH (DN 100) BODY: IN 4-INCHES (102 mm) OUTLET PIPE SWAGED UP TO 8-INCHES (203 mm)

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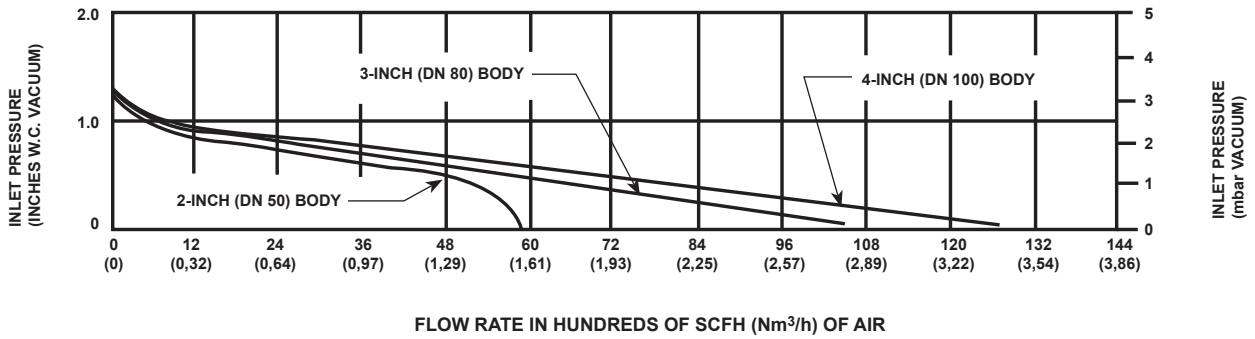
BJ9211-A
BJ9213-A
A2569/IL

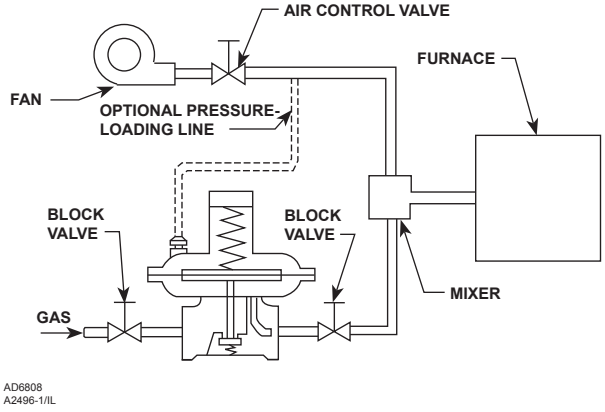
Figure 6. *Typical Performance Curves for Standard Type 66Z Regulator with Internal Registration*



NOTE:
FLOWS ARE IN SCFH AT 60°F AND 14.7 PSIA (AND IN THOUSANDS OF Nm³/h AT 0°C AND 1,01325 bar) OF AIR. FOR EQUIVALENT FLOWS OF OTHER GASES, DIVIDE BY THE SQUARE ROOT OF THE APPROPRIATE SPECIFIC GRAVITY. THEN, IF CAPACITY IS DESIRED IN NORMAL CUBIC METERS PER HOUR (Nm³/h) AT 0°C AND 1,01325 bar ABSOLUTE, MULTIPLY SCFH BY 0.0268. EACH CURVE REPRESENTS SETTING POINT OF 1-INCH W.C. (2,50 mbar) VACUUM MADE AT 8-INCHES W.C. (20 mbar) VACUUM OUTLET PRESSURE AND 300 SCFH (8,04 Nm³/h) AIR FLOW.

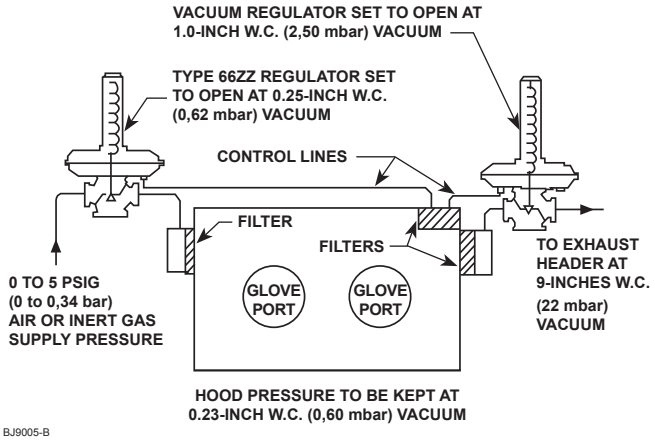
BJ9126-A
A2571/IL

Figure 7. *Typical 66 Series Vacuum Regulator Capacity Performance Curves*



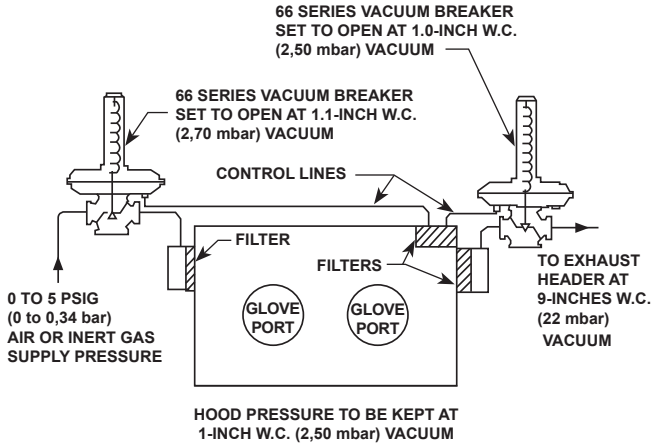
AD6808
A2496-1/IL

Figure 8. *Type 66Z Regulator Installation in Furnace Mixing System*


VACUUM REGULATOR SET TO OPEN AT 1.0-INCH W.C. (2,50 mbar) VACUUM
TYPE 66ZZ REGULATOR SET TO OPEN AT 0.25-INCH W.C. (0,62 mbar) VACUUM
CONTROL LINES
FILTER
FILTERS
TO EXHAUST HEADER AT 9-INCHES W.C. (22 mbar) VACUUM
GLOVE PORT
GLOVE PORT
0 TO 5 PSIG (0 to 0,34 bar) AIR OR INERT GAS SUPPLY PRESSURE
HOOD PRESSURE TO BE KEPT AT 0.23-INCH W.C. (0,60 mbar) VACUUM

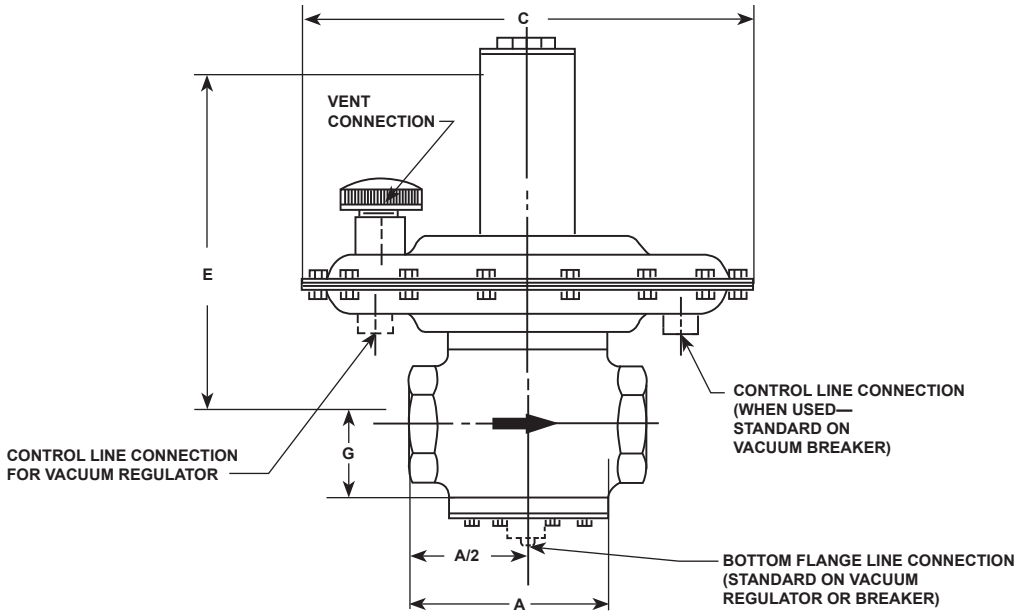
BJ9005-B
A2494-2/IL

Figure 9. *Type 66ZZ Regulator Installation in Hood Control System*


66 SERIES VACUUM BREAKER SET TO OPEN AT 1.0-INCH W.C. (2,50 mbar) VACUUM
66 SERIES VACUUM BREAKER SET TO OPEN AT 1.1-INCH W.C. (2,70 mbar) VACUUM
CONTROL LINES
FILTER
FILTERS
TO EXHAUST HEADER AT 9-INCHES W.C. (22 mbar) VACUUM
GLOVE PORT
GLOVE PORT
0 TO 5 PSIG (0 to 0,34 bar) AIR OR INERT GAS SUPPLY PRESSURE
HOOD PRESSURE TO BE KEPT AT 1-INCH W.C. (2,50 mbar) VACUUM

BJ9005-B
A2558/IL

Figure 10. *66 Series Vacuum Breaker and Regulator Installation in Hood Control System*



AD6045-F
A2572-1/IL

NOMINAL BODY SIZE, INCH (DN)	A								C		E				G			
	NPT Cast Iron Body		NPT Steel Body		CL125 FF Cast Iron or CL150 RF(1) Steel Body		CL300 RF Steel Body				Type 66 or 66Z		Type 66ZZ or 66 Series Vacuum Regulator or Breaker		NPT Steel Body		All Others	
	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm
2 (50)	7.25	184	9.25	235	10.00	254	10.50	267	13.88	353	15.00	381	21.38	543	3.31	84,1	3.25	82,6
3 (80)	- - - -	- - - -	- - - -	- - - -	11.75	298	- - - -	- - - -	16.00	406	17.62	448	24.00	610	- - - -	- - - -	4.62	117
4 (100)	- - - -	- - - -	- - - -	- - - -	13.88	353	- - - -	- - - -	18.00	457	21.25	540	27.63	702	- - - -	- - - -	5.38	137

1. Dimension also is same for 2-inch (DN 50) CL150 FF steel body.

Figure 11. *Dimensions*

Ordering Information

When ordering, specify:

Application

1. Composition and specific gravity of gas (including chemical analysis if possible).
2. Range of temperatures, flowing inlet pressures (maximum, minimum, nominal), and pressure drops.
3. Desired outlet (control) pressure setting or range.
4. Range of flow rates (minimum controlled, maximum, normal).
5. Piping size(s).

Construction

Refer to the Specifications section on page 2 and to each referenced table; specify the desired selection whenever there is a choice to be made. Always be sure to specify the regulator type number.

Ordering Guide

Body, Body Size, and End Connection Styles (Select One)

Cast Iron Body (Select One)

- ☐ 2-inch NPT**
- ☐ 2-inch (DN 50) CL125 FF**
- ☐ 3-inch (DN 80) CL125 FF**
- ☐ 4-inch (DN 100) CL125 FF**

Steel Body (External Pressure Registration Only)

- ☐ 2-inch NPT**
- ☐ 2-inch (DN 50) CL150 FF**
- ☐ 2-inch (DN 50) CL150 RF**
- ☐ 2-inch (DN 50) CL300 RF**
- ☐ 3-inch (DN 80) CL150 RF**
- ☐ 4-inch (DN 100) CL150 RF**

Outlet (Control) Pressure Range

66 Series Pressure Reducing Regulators

Type 66

- ☐ 2 to 5-inches w.c. (5 to 12 mbar)**
- ☐ 4 to 8-inches w.c. (10 to 20 mbar)**
- ☐ 4 to 11-inches w.c. (10 to 27 mbar)**
- ☐ 7 to 12-inches w.c. (17 to 30 mbar)**
- ☐ 8 to 28-inches w.c. (20 to 70 mbar)**
- ☐ 10 to 17-inches w.c. (25 to 42 mbar)**
- ☐ 14 to 28-inches w.c. (35 to 70 mbar)**
- ☐ 0.75 to 1.5 psig (52 to 103 mbar)**
- ☐ 1 to 2 psig (69 to 138 mbar)**
- ☐ 1.5 to 3 psig (103 to 207 mbar)**
- ☐ 3 to 5 psig (207 to 345 mbar) (not available for 4-inch (DN 100) body)**

Type 66Z

- ☐ -1 to 2-inches w.c. (-2 to 5 mbar)

Type 66ZZ

- ☐ -0.25 to 0.25-inches w.c. (-0,62 to 0,62 mbar)

66 Series Vacuum Regulator or Breakers

- ☐ -0 to 1.5-inches w.c. (0 to 4 mbar) (not available for 2 and 3-inch (DN 50 and 80) body size)
- ☐ 0 to -2-inches w.c. (0 to -5 mbar)
- ☐ -0.2 to -0.8-inches w.c. (-0,74 to -2 mbar) (not available for 3-inch (DN 80) body size)
- ☐ -2 to -6-inches w.c. (-0,5 to -15 mbar)

Trim Material (Select One)

- ☐ Brass**
- ☐ 316 Stainless steel**

Pressure Registration (Select One)

- ☐ Internal (cast iron standard)**
- ☐ External (required for steel, optional for cast iron)**

Replacement Parts Kit (Optional)

- ☐ Yes, send one replacement parts kit to match this order.

Regulators Quick Order Guide	
* * *	Standard - Readily Available for Shipment
* *	Non-Standard - Allow Additional Time for Shipment
*	Special Order, Constructed from Non-Stocked Parts. Consult your local Sales Office for Availability.
Availability of the product being ordered is determined by the component with the longest shipping time for the requested construction.	

Specification Worksheet

Application:

Specific Use _____

Line Size _____

Gas Type and Specific Gravity _____

Gas Temperature _____

Does the Application Require Overpressure Protection?

☐ Yes ☐ No If yes, which is preferred:

☐ Relief Valve ☐ Monitor Regulator ☐ Shutoff Device

Is overpressure protection equipment selection assistance desired? _____

Pressure:

Maximum Inlet Pressure (P_{1max}) _____

Minimum Inlet Pressure (P_{1min}) _____

Downstream Pressure Setting(s) (P_2) _____

Maximum Flow (Q_{max}) _____

Performance Required:

Accuracy Requirements? _____

Need for Extremely Fast Response? _____

Other Requirements: _____

_____

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